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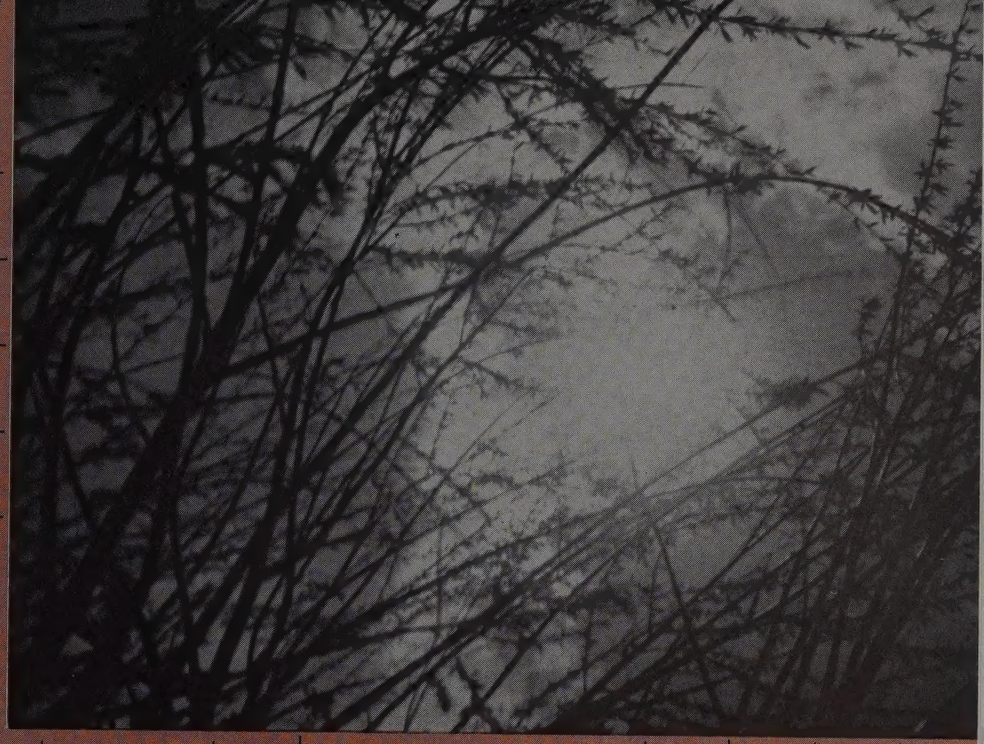

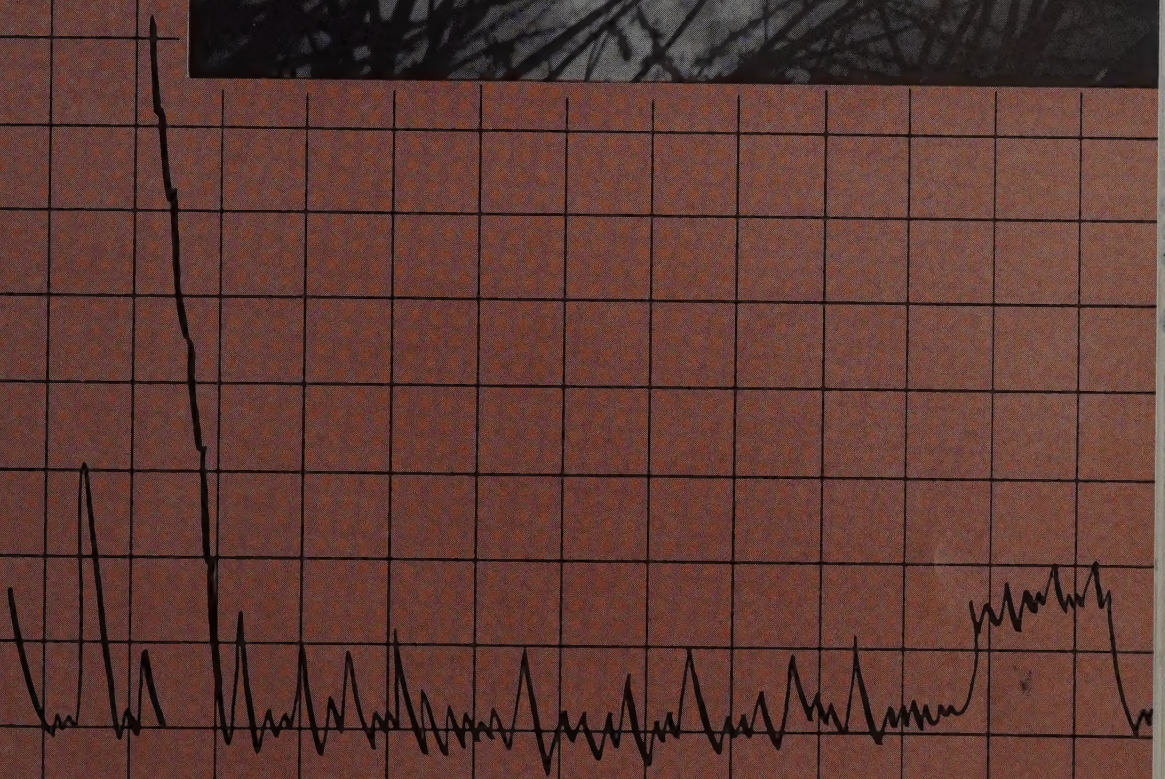

the **illinois technograph**

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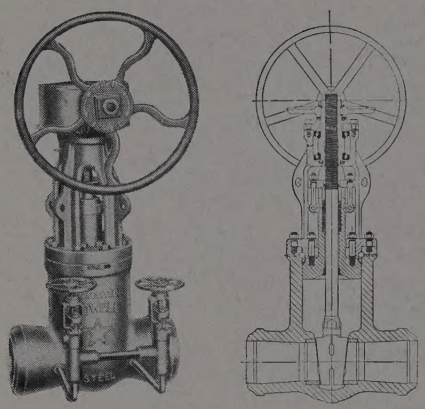
Another page for **YOUR BEARING NOTEBOOK**



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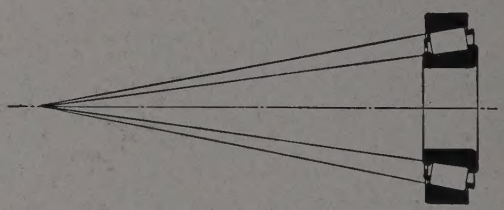

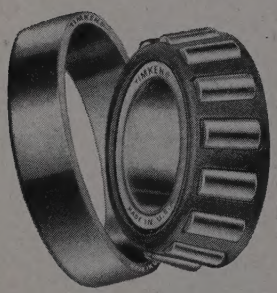

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A gun barrel made of glass . . .

This scientist is putting together the barrel of an "electron gun." When completed, it will be capable of developing cancer-killing rays at twice the power of those given off by all the medical radium in the world.

The barrel of the gun, part of a new super-voltage X-ray machine used in cancer research and treatment, is a tube formed by stacking precision-made rings of one of Corning's special electrical glasses.

Two million volts drive electrons through the tube, much as a bullet is driven through a gun barrel. As these electrons are suddenly stopped by a water-cooled block of gold at the end of the barrel, two-million-volt X-rays are generated. This X-ray beam is powerful enough to reach diseased areas four inches inside the body and it can be directed with great accuracy on the spot the doctor wants to bombard.

High Voltage Engineering Corporation, manufacturers of this generator, at first had difficulty finding a high-voltage electrical insulating material for the gun barrel, a material that would stand electron bombardment hour after hour without breaking down. The answer to their problem was a glass selected from the many developed by Corning to meet exacting electrical specifications.

Providing glass for medical research is not new to Corning. Since the early days of X-rays, glass by Corning has played a vital part in the development of X-ray apparatus —transmitting glasses for tubes and absorbing glasses for shields. And Pyrex brand laboratory and pharmaceutical glassware has served medical science since World War I.

Throughout industry, *Corning means research in glass*—research that has contributed in countless ways to better products and processes, and through them, to better living for us all.

That's why we suggest—when you're out of college and concerned with improving products or processes—that you consider glass, a material of practically limitless uses. And should you want to know more about Corning electrical glasses, or the hundreds of other glasses Corning makes, we hope you'll write us before your planning reaches the blueprint stage. Corning Glass Works, Corning, New York.

CORNING
means research in glass

is 50c too much?...

. . . or is it plain ignorance that accounts for 50 per cent of the engineering undergraduate students who are not members of their professional engineering societies on campus?

Incoming freshmen have a right to ask, "What is an engineering society and what does it do?" To this, one should answer that the societies here on campus are the student chapters of national engineering societies that offer a social and professional bond for the men in the respective branches of engineering. The word "union" can not be applied to the professional engineering society, for it works for the higher cultural and intellectual development of its members as well as trying to further the interests of the profession as a whole.

The student branches here on campus offer the beginning of this professional development and serve to introduce the student to an overall picture of his profession. Student society activities which accomplish this end range from field trips and engineering lectures to student-faculty coffee hours and small engineering projects. The average semester's dues, about 50 cents, offers a great deal.

To other students, little need be said other than that they are missing an opportunity which may eventually retard their professional growth, unless they join the parent societies after graduation.

Look around or inquire about the time and place of your professional society's meeting and then attend it. As an engineer, you will command respect in the world, but your profession will mean nothing to you if you isolate yourself from the friendship and ideas of your fellow-engineers.

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Published eight times during the year (October, November, December, January, February, March, April and May) by the Illini Publishing Company. Entered as second class matter, October 30, 1920, at the post office at Urbana, Illinois, under the Act of March 3, 1879. Office 213 Engineering Hall, Urbana, Illinois. Subscriptions $1.50 per year. Single copy 25 cents. Reprint rights reserved by *The Illinois Technograph*. Publisher's Representative—Littell Murray-Barnhill, 605 North Michigan Avenue, Chicago 11, Ill. 101 Park Avenue, New York 17, New York.

the illinois technograph

volume 66 **number 5**

contents:

editorial ---------- 2

the fluorescent lamp ---------- 6

explosives ---------- 8

senior-faculty banquet ---------- 10

boneyard bilge ---------- 12

navy pier ---------- 13

introducing ---------- 14

honorary and society news ---------- 15

skimming industrial headlines ---------- 32

our cover

This interesting composition of a weeping willow tree silhouetted against a sudden burst of sun in a cloudy sky was taken by TECH assistant editor John Huber. He used a Fed Flash camera, verichrome film, and a K2 filter.

its growing popularity has created a permanent niche for . . .

the fluorescent lamp

by Val McClusky, E.E. '51

Since the 1940 appearance on the market of the fluorescent lamp, this type of light source has become increasingly important to the general public. Not only has it found a growing popularity in commercial lighting installations, but through continued improvements and developments, it has come into greater use in home lighting as well. Although it was at first received with some reluctance and skepticism by many people, it appears now that the fluorescent lamp is here to stay — at least, for a long time to come.

The fluorescent lamp is "an artificial source of light, basically an electric discharge lamp, in which ionization of the gas produces radiation that activates the fluorescent material on the inside of the glass tubing. The radiant energy from the electric discharge is transferred by suitable materials (phosphors in the fluorescent coating) into wavelengths giving more light (higher luminosity)."

Obviously, however, this definition must be further clarified by defining the term "fluorescence." Fluorescense is defined as:

"Emission of light by a material only during excitation by some other source, such as by electrons, ultra-violet light, or x-rays. When the glow of light persists after the excitation is removed, the effect is called phosphorescence."

Theory of Ultra-Violet Radiations

Most of the fluorescent lamps that are in use today make use of ultra-violet radiations of wave-length 253.7 *mu*, produced by an electric discharge in a tube containing mercury vapor. As stated in the above definition, radiant energy from the mercury vapor strikes a fluorescent material, a phosphor coating inside the tube, and is then transformed into visible light. The actual mechanisms involved in this transformation of ultra-violet into visible light by action of the tube coating will not be considered. The production of the radiant energy in the ultra-violet portion of the spectrum, however, will be investigated in more detail.

When energized by some method, an electron may move from one orbit of an atom to another stationary orbit, remaining there in an unstable condition for a short period of time (about 10^8 *sec*), soon returning to its stable orbit. It is on this return "jump" that the electron releases energy in the form of radiation. An electron may move or "drop" from one stationary orbit to the next orbit nearest the nucleus with the emission of one "quantum" of radiation. When acted upon by large amounts of energy, the electron may be excited to some outer orbit, from which it must fall through several energy levels before reaching its stable orbit. Consequently, it may release a quantum of radiation with each successive jump.

Obviously, then, some method of excitation of atoms must be provided before these radiations can be obtained. In the gaseous discharge lamp this is accomplished by using electrons to bombard molecules of the gas whose spectral radiation is desired. The gas is introduced into a tube from which most of the air has been withdrawn. A pair of electrodes is sealed into the lamp, one an anode and one a cathode, the latter being a material which, when heated, will emit electrons. A voltage placed across these electrodes accelerates the electrons being emitted, causing them to collide with a greater force when they chance to strike molecules of the gas present in the tube. When this voltage is such that electrons strike atoms of the gas with just sufficient energy to cause them to begin radiating, the "first resonance potential" has been reached. At this point, electrons are knocked from the first stationary orbit to the second stationary orbit, and upon returning, they emit a photon of one single frequency—a "single-line spectrum." As the accelerating voltage is increased, other spectral lines are produced.

When this voltage becomes strong enough that electrons being emitted are given sufficient energy to knock electrons of the gas atom entirely beyond the outer orbit, the "ionization potential" has been reached. The gas atoms then possess a positive charge, due to the loss of electrons, and they become electrically conducting. At this time, the "complete arc spectrum" is obtained.

Construction of the Lamp

The ordinary fluorescent lamp is constructed from a glass tube, round in cross-section, from which most of the air has been withdrawn. The pressure within the tube is about 6 to 10 microns—about .00001 normal atmospheric pressure. The tube contains a drop of mercury and a small portion of argon gas, which aids in starting the lamp.

On the inside walls, the tube is coated with chemicals which absorb the ultra-violet radiations from the mercury and transform them into visible light. These chemicals are very finely divided powders, whose particles have diameters from .00008 to .0002 *in.* Great care must be exercised in obtaining coatings of proper thickness. If the coating applied is too thin, much of the ultra-violet radiation is not utilized. If the coating is too thick, much of the light is reabsorbed by the particles. In the standard 40 watt white or daylight fluorescent lamp, the amount of coating used weighs only two to three grams.

Ordinarily, the chemicals used to provide this fluorescent coating are a mixture of zinc beryllium silicate and magnesium tungstate. They are mixed in such proportions that their combined sensitivity is a maximum for radiation of 253.7 *mu* in wave-length.

The cathode, the electron-emitting el-

Val earned his degree in electrical engineering at commencement a week and a half ago. Illumination engineering is his specialty, so that an article on fluorescent lighting is right up Val's professional alley.

Membership in AIEE-IRE, IES, Phi Eta Sigma, Eta Kappa Nu, and the YMCA constituted his extra-curricular activities on campus. He served as IES chairman this fall semester and was chairman of the society's prize-winning exhibit at last year's ISEE.

At present, Val is beginning work in his new job with General Electric.

VAL McCLUSKY

ement of the tube, is one of two types: the "hot cathode," or the so-called "cold cathode." The hot cathode is the more common of the two.

The Starter

A starter for a pre-heat lamp has two functions: (1) providing a completed circuit for current heating the filaments, and (2) opening this circuit when the filaments have heated to the point at which the lamp becomes conducting.

The GE Company manufactures three kinds of pre-heat starters: the glow-switch, the "watch-dog," and the thermal switch starter.

The first of these, the glow-switch starter, is a small container filled with some gas, such as neon, and a bimetallic metal strip with a high thermal coefficient. When sufficient voltage is placed across the contacts of the switch, the neon gas begins to glow, and the heat from the gas causes the bimetallic strip to expand and short out the voltage across the switch contacts. This stops the glow of the gas, and the strip cools and opens the switch again by contracting.

The second of these, the watch-dog starter, operates on the same principle as the glow-switch starter. It differs in that it has a heating coil element which operates a small arm in such a manner that it activates a switch which opens the filament circuit of the lamp when, after several repeated attempts, the lamp fails to start. This protective device goes into operation after about fifteen to twenty *sec* of futile starting attempts.

The third type, the thermal switch starter, relies on a small heating element which causes a small metallic strip to expand and open a switch which de-activates the starter circuit after the lamp has begun operation.

The FS-44, a thermal switch starter for use with a 40 watt lamp, is said to give the best all-around performance, especially under conditions unfavorable to good lamp performance, such as: operation with direct current, low temperatures, and variable voltages.

The Ballast

The ballast of the fluorescent lamp circuit has two chief functions: (1) that of allowing the proper voltage to be delivered to the lamp, and (2) that of limiting the current through the lamp to the proper value.

Ballasts are generally of two types: (1) the resistance ballast and (2) the coil ballast.

The coil ballast, the more common of the two, is essentially a choke coil winding imbedded in an impregnated material and enclosed in a metal container. This compact enclosing of the coil serves to minimize hum, an inherent feature of the coil ballast. However, the coils radiate heat, and care must be exercised in preventing the temperature of the container from becoming too great. The temperature of a ballast, as measured on the wall of the container, should never exceed 194° *F.*

In the so-called "Tulamp" ballast, by GE, one lamp is ballasted by inductive reactance only, while the other lamp contains inductive and capacitive reactances in series. The overall power factor of this circuit is about 95%. The stroboscopic effects are considerably reduced in this type of circuit, since the voltages for the two lamps contain components that are 180° out of phase.

A disadvantage of the conventional fluorescent lamp ballast is weight. Weights range from 1½ *lbs* for a single-lamp ballast for a 15-watt lamp to 10¼ *lbs* for the 100-watt lamp. Obviously, some applications would make so much bulk undesirable.

The resistance ballast, the less common of the two chief types, has the disadvantage of producing undesired power loss, and at the same time, can provide no high voltage inductive "kick" to aid in starting the lamp. However, this type of ballast can be used in some circuits with decided advantages.

(*To be concluded in March issue*)

An example of cove lighting using fluorescent fixtures is shown in this view of a California bowling alley. (Courtesy of Swedish Iron and Steel Corp.)

Diffused lighting from cove installation by Electrical Products Corp. of California fills entire room of modern restaurant. (Courtesy of Swedish Iron and Steel Corp.)

A 11,700 lb charge of dynamite opens a rock cut along the course of the future Friant-Kern Canal in California. (Courtesy of Explosives Engineer).

modern mining uses . . .

explosives

by Joe Enrietto, Min.E. '53

Did you ever stop to consider where modern civilization would be if explosives had never been discovered? Did you know that in 983 B. C. it took 40,000 men one year to mine only three tons of silver? With the aid of dynamite it is now possible to blast 2,000,000 tons of rock with one shot. From one mine alone more than 2½ million tons of ore per year are taken. 30,000 Roman laborers worked 11 years to drive a 6 x 10 *ft* tunnel 3½ miles through a mountain. In modern times the Cascade tunnel was driven at the rate of 55 *ft* per day.

All of these modern projects were made possible through the use of explosives. An explosive has been defined as a substance capable of developing a sudden pressure on its surroundings caused by a conversion of it (the substance) into a gas occupying a much larger volume than the original. Almost any substance which will burn will explode if under proper conditions. Examples of this are the disasterous explosions caused by finely divided coal dust or flour mixed with air. Dynamites may explode with varying intensities, depending on how the explosion is initiated. When the maximum power of the dynamite is realized, it is said to have detonated. Every explosion is an exothermic reaction. Oxygen is usually supplied by the explosion itself.

There are several types of explosives. These are blasting propellants, initiators (caps, primers, etc.), and pyrotechnic mixtures (smokes, flares, incendiaries, etc.). As one can easily see, the field of explosives is a broad one and it is the purpose of this article to deal almost exclusively with commercial explosives.

Blasting explosives usually fall under two categories, high and low explosives. The most common low explosive is black powder, which was known to ancient China. It contains sodium nitrate, charcoal, and sulphur in proportions of about 72, 16, and 12 per cent, although these can vary. High explosives can be subdivided into two more classes: those containing nitroglycerine and those not containing nitroglycerine. Examples of the latter are picric acid and ammonium nitrate. There are a multitude of explosives containing nitro-glycerine and these will be more fully discussed later. A low explosive can be fired by the flame of an ordinary match, but a high explosive requires a more powerful igniter. A substance which itself explodes is used. Examples of these, which are called detonators, are fulminate of mercury and lead azide.

The U. S. Bureau of Mines furnishes still another classification of explosives called permissible explosives. A permissible explosive has a nitro-glycerine or ammonium nitrate base and has passed certain tests. In order for an explosive to be safe in a gassy mine, the flame should be short of duration and at a relatively low temperature.

No more than 158 liters of poisonous gas may be given off per 1½ *lb* of explosive. The ammonia permissibles contain 7-15 per cent nitro-glycerine and 60-80 per cent ammonium nitrate. Water or some easily volatized salt is often added to absorb some of the heat. Sheathed explosives have a sheath of an inert salt such as sodium-carbonate or borax around the explosive. The sheath acts as a cooler and lowers the temperature of the flame.

All explosives have a velocity of detonation which increases as the density increases. The velocity of detonation is the rate in *ft/sec* which a detonation wave travels through a column of explosive. In general the faster the velocity of detonation the more powerful the explosive. For example: gunpowder has a velocity of detonation of 1500 *ft/sec* while blasting gelatin has one of 26,200 *ft/sec*. This is very fast when one stops to realize that the velocity of sound is about 1100 *ft/sec*. There are several methods for measuring the velocity of detonation of a given explosive. Of the two methods which will be described here, the electronic chronoscope yields the most accurate results, but the Dautriche is the simpler and easier to use.

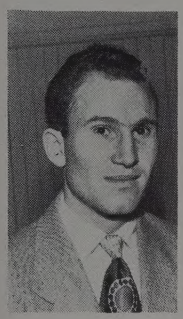
In the Dautriche method, the unknown velocity of an explosive is compared to that of an explosive whose velocity is known. The explosive of known velocity is usually a length of Cordeau fuse about two meters long.

The midpoint of the fuse is marked and the ends are inserted into the side of a catridge of the explosive which is to be tested at points a given distance apart. The middle portion of the loop is laid in a straight line upon a lead plate 6-8 *mm* thick with the midpoint of the fuse at a marked point on the plate. The cartridge is then detonated from one end. When the detonation wave reaches the first point, that end of the fuse is fired. When the wave reaches the second point, the other end of the fuse is fired. Where the two waves in the fuse meet they will make a deep furrow in the lead plate. If the distance between that furrow and the midpoint is D, the first wave traveled through half the fuse plus D and the second wave traveled through the cartridge plus half the length of the fuse minus D. Letting the known velocity be V, a simple formula can be evolved for finding the unknown velocity of detonation, in which $V = \frac{2D}{V_1}$

The electronic chronoscope consists of an appropriate circuit of tubes, condensers, etc., which will measure very

small time intervals accurately by means of the change in plate currents. This current change is caused by either opening or closing the circuits. Wires are placed a measured distance apart in the explosive cartridge. The chronoscope is so devised that when the detonation wave hits the first wire an electronic tube is ignited.

As the detonation wave reaches the second wire, another tube is ignited.



JOE ENRIETTO

A long time has elapsed since TECH presented a feature connected with some phase in mining engineering, but Joe Enrietto, a sophomore in this field, has written an article concerned with explosives application and theory.

A native of Spring Valley, Ill., Joe was one of a group of engineering freshmen selected last year for staff membership on the basis of their high Rhetoric grades. This is his first full-length article.

The chronoscope measures the lapse of time between the two events. The velocity of detonation is then found by merely dividing the time elapsed by the distance between the wires in the cartridge.

One must realize the difficulties which confront anyone who attempts to find what causes a detonation. The detonation takes place practically instantaneously with the release of a tremendous amount of energy. Why do some substances such as black powder explode while others like nitro-glycerine detonate with a powerful shattering effect? An explosion can be likened to a powerful shove, while a detonation is more like a shattering blow. In the following paragraphs, the hydrodynamic theory of detonation will be set forth.

When an explosion takes place a great quantity of heat is liberated, approximately one kilocalorie per gram of material. Grain size, density, and many other factors determine the intensity of the blast. If the reaction is not inhibited, its final rate and violence will follow the laws of propogation of wave motion and a steep-fronted detonation wave will be formed. Of course, maximum velocities of detonation are seldom obtained due to several intervening factors: lack of confinement by surroundings which permits explosive products to expand, thus reducing the pressure behind the detonation wave; insufficient supply of initiating energy; effects of physical state of explosive; and other factors. As the formation of detonation waves in solid explosives is almost identical with that in gases, it is more convenient to consider what happens when a gas is detonated in a long open tube. One aspect must not be overlooked, however, and that is the fact that while the initial pressure for a solid explosive is so minute as to be negligible, that for a gaseous mixture should be considered in measuring the velocity of detonation.

After the gaseous mixture in the tube is ignited at one end, a flame forms and rapidly accelerates until it reaches an optimum velocity. The flowing burned gases build up a pressure in the fresh gas causing them to compress. This results in a shock wave being formed. The shock wave travels with a very high velocity, several times faster than sound, and the flame, or zone of burning gas, is found to be contained in this wave. The speed of the shock wave is determined by the nature of the mixture which is being detonated, and is constant for any given mixture. Its speed depends very little on temperature or other conditions in the rear of the tube. Early observers also discovered that a similar wave of high velocity was formed and proceeded in the opposite direction. Thus these waves obey the law of conservation of momentum.

Perhaps the theory of this wave action can be better comprehended by a simple analogy. Imagine a gas in a cylinder with a piston at one end. Let the piston move forward gradually accelerating. As it starts its movement, the piston generates a wave which moves with a given velocity. While the piston accelerates it keeps forming new waves, each successive wave having a higher velocity than the one before it. Eventually the waves will overtake one another and form one big wave front of maximum velocity and power. Of course in an explosion this takes place so rapidly as to be instantaneous.

As the base for most of the modern high blasting explosives is nitro-glycerine, it might be well to investigate it a little more fully. It was in 1846 that Sobrero first made nitro-glycerine by adding two volumes of sulfuric acid and one volume of nitric acid to glycerine, meanwhile keeping the temperature below $0°C$. He collected the oil and washed the excess acid away. The result was a transparent liquid the color of olive oil. Sobrero discovered many of nitro-glycerine's interesting properties. He found that it detonates when brought into contact with potassium. When heated very carefully it will decompose, but is extremely sensitive to shock and will explode violently if jarred. Nitro-glycerine has a marked physiological effect on human beings. If its fumes are inhaled, violent headaches are felt and the limbs become extremely weak.

Since Sombrero's time, the manufacture of nitro-glycerine has come a long way. In one modern process, one part of glycerine is nitrated with six parts of a mixed acid containing 40 per cent of nitric acid, 59.5 per cent of oleum, and 0.5 per cent of water. The process is carried on in steel or cast iron cauldrons. Compressed air does the mixing and brine coils keep the temperature down. If the temperature rises above $25°C$, the whole charge is dumped into a drowning tank to prevent an explosion. The nitro-glycerine is obtained from the mixture by a gravitational process, the nitroglycerine having the lower density. After being washed and dried, the nitro-glycerine is ready for use.

Nitroglycerine will decompose if heated to about $60°C$, but if heated to $218°C$, it will explode. Nitro-glycerine is not very inflammable, but small amounts can be safely burned. However, if an attempt is made to burn a large amount, the heat accumulates and an explosion will occur. Frozen nitro-glycerine does not explode as easily as that which is at room temperature or warmer. In drop tests performed with a two kilogram weight, it was found that while at room temperature a fall from a height of $12cm$ was required to explode the nitroglycerine, three times the drop was required to explode it when frozen. Like other explosives nitro-glycerine has varying velocities of detonation depending on loading conditions and initiation. They range from 1300 to 7500 meters per second.

For several years after its discovery, nitro-glycerine was little thought of as an explosive. It remained for Alfred Nobel to discover new methods of manufacturing it, and to devise a way of putting it to practical use. The main difficulty here was to discover how to initiate the blast. Nobel first used black powder in a glass vessel as a detonator. From this he developed what we know as blasting caps containing either fulminate of mercury or lead azide. From

(*Continued on page* 20)

The blasting of river ice is used to prevent spring floods. (Courtesy of Explosives Engineer).

TECHNOGRAPH goes to a . . .

senior-faculty banquet

by Carl G. Blanyer, E.E. '51

In many departments of the College of Engineering, a senior-faculty banquet is an annual and final get-together for graduating seniors and their instructors. These banquets are times for joviality when both groups poke mild fun at each other on little incidents that have happened during their four years' association with each other.

The Electrical Engineering Senior-Faculty Banquet is a time-honored affair that is truly typical of such a banquet. Done up in true engineering style, the E.E. banquet is one at which "anything can happen—and usually does . . ."

The annual Electrical Engineering Department Senior - Faculty Banquet was perpetrated shortly before finals, January 16, in the Illini Union Ballroom. This event has been taking place for years and years, and is characterized by its extreme lack of solemnity. Its purpose is to foster cordial relations between faculty and students, enable seniors who will soon be graduating to get together for one last time, and provide an opportunity for fun and relaxation before a usually rough set of finals.

A lot of work was done in arranging the banquet, skits, and props by Jim Kay, Dick Didier, Ed Stelter, Ron Mackin, Rog Trapp, and Jerome Kennedy; and by an anonymous group of faculty members headed by Professor D. F. Hang. Altogether some 20 students and 10 faculty members took part in the entertainment.

The banquet itself occupied the first part of the evening, and was enlivened considerably by traditional water pistol fights which broke out among students and instructors. During the procedings one well-known professor (who goes by the name of Buck) was the recipient of one pitcher of water minus pitcher, and M. S. McVay wrought havoc among the terrorized students with his multi-squirt machine gun (see cut).

After the coffee cups had been removed and things had quieted somewhat, the only serious event of the evening took place. This was the presentation of the Eta Kappa Nu award for the outstanding graduating senior; the award to the man chosen from February graduates is usually presented at this banquet, as was done this year. Jesse R. Stone received the award, and Robert B. Laube and Marion W. Baty were honorable mentions.

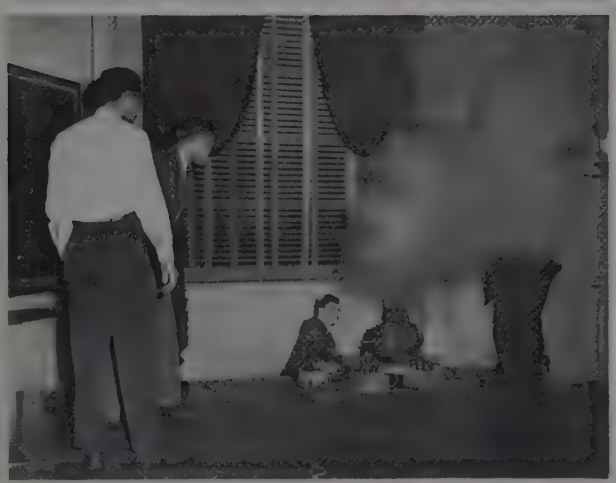
After a few announcements, including one that "pop" hour exams would be given the following morning in half a dozen E.E. courses, the entertainment began. First on the agenda was the presentation of the infamous "Ryder Award," given in recognition of the "Screwball of the Year." For his grades, his activities in and out of classrooms, his efforts toward advancement of electrical engineering education, and his general demeanor, Wolfgang A. Bachem was selected for this honor. His prize was a book, presented by Dr. Ryder himself. Ryder suggested that a few paragraphs on page 185 be read aloud, for the edification of the crowd. The book, a text from its cover, surprisingly contained passages of a most intriguing nature, such as are usually associated with contemporary best-sellers. Bachem read with great gusto.

The student skits were presented next. Jack Ritt and Al Makulec played alumni, overcome with nostalgia and the desire to revisit old scenes and see old faces. They stopped in at various classrooms and offices, and met several of their ex-professors in the halls.

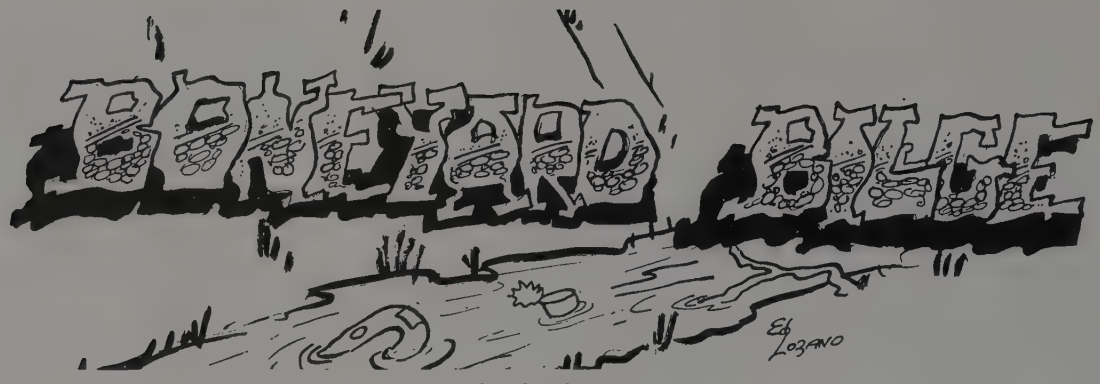
Their first stop was the office of Dr.

(*Continued on page 22*)

(Left): Jesse R. Stone receives the HKN "Outstanding Graduating Senior" award from HKN counselor M. B. Reed while president Eugene Mueller (left) and award committee head Jack Ritt look on. (Right): Battle-scarred Prof. M. S. McVay mows down hysterical seniors at point-blank range during banquet.



(Upper left): Dignified professors McVay (foreground) and D. F. Hang solemnly propel model cars around ballroom floor while senior Ed Stelter smiles approvingly. (Upper right): "Returning alumni" Al Makulec (left) and Jack Ritt chat with "Dr. Ryder" (Norman Weinhouse, right). (Lower left): Motor goes up in cloud of smoke in Dynamo Lab skit as half-hidden "Prof. Williams" (John Fijolek) rushes to the rescue with electric fan and students Dick Didier, Carl Blanyer, and Gene Leichner watch aghast. (Lower right): Willie Turnipseed, graduating EE (Dr. W. L. Everitt), attempts to identify object (ancient vacuum tube) held by Prof. Fiddlefaddle (Dr. J. D. Ryder) during "quiz" in faculty skit "W. T. at Illinois." Part of Board of experts watches with mixed emotions. Board includes, from left to right: M. S. Helm; C. V. Jakowatz; E. F. DeMers; and W. L. Emery. (All photos by Wayne Welk).



by Bob Schrader, M.E. '54

"STURDY GERTIE"

A bridge near and dear to all civil engineering hearts is the famed old Tacoma Narrows River bridge that astounded all structural theory, years ago, by beginning a series of wave motions under certain wind loadings. The suspension bridge actually resembled a galloping sine curve with the deck lifting and falling in regular wave motions. Movies of "Galloping Gertie," as the structure was known, have been shown to every U. of I. civil engineering student at some time in the course of his college career.

Last fall, on the same site of "Galloping Gertie," a new bridge was erected. Reputed to be five or six times stronger than her sister, the new bridge has been dubbed "Sturdy Gertie."

* * *

Flush Ye Boneyard

* * *

DRAFT STATUS

"Drafting of engineers would create a serious national problem," says a recent article in the magazine, *Mechanical Engineering.* According to this article, the United States faces a shortage of 30 to 60 per cent engineers, annually. This shortage is partly due to the smaller enrollment in college and partly due to fewer freshmen enrolling in engineering.

The answer to this shortage lies not in drafting engineers from the campus, but in sending more engineers to college. Relax, engineer, Uncle Sam needs you here at the U. of I.!

* * *

Flush Ye Boneyard

* * *

BLARNEY STONE RETURNED

After an alleged nine-months resting place in a pile of rags in the attic of a house a stone's throw from Prehns', the Blarney Stone was returned to its rightful owners at the Agriculture Club Talent Show last January 10.

Errol Rodda, Engineering Council president, accepted the stone on the behalf of the Engineering College and in a short address of thanks told members of the Ag Club that the stone's disappearance "wouldn't happen again."

The Blarney Stone began its short and tempestuous career last year, under rather peculiar circumstances, on the bed of the Boneyard Creek. Explosions, a fountain of green water, and ominous rumblings led to its discovery. Rumored to be the original Blarney Stone of the engineers' patron saint, St. Pat, the stone has become an honored symbol to U. of I. undergraduate engineers. It is displayed on state occasions at engineering festivities.

* * *

Flush Ye Boneyard

* * *

"ENGINEER'S NIGHTMARE"

(The following poem, by Charles F. Thomas, Jr., serves as a dedication to all mining and metallurgical engineers. It is reprinted here from the September-October, 1947, issue of *The Explosives Engineer.)*

Grinning goblins dance and grimace,
Ugly ogres sneak and creep,
Tommy knockers rap my headboard,
All disturb my troubled sleep.

Worried dreams are filled with pictures,
Crooked lines that never meet,
While those imps of Satan mumble,
Incantations of defeat.

Do their antics have some meaning?
Are their dreams a grim forecast
Of some error in my figures
Which may haunt me from the past?

For a tunnel may be driven
Up or down or roundabout,
But if headings missed each other,
Engineers would soon lose out.

Hard rock miners man the jumbos,
Tough machines gnaw out the rock:
Work like badgers 'neath the moutain
All the hours round the clock.

So while North goes south on tangent,
And South heads north just as true,
Nights and days will all be troubled
Till the miners "hole 'er through!"

PRACTICE MAKES PERFECT

Sad is the lot of the student: Toward the end of last semester, an E.E. professor gave his students a practice exam, including the answers to the problems as extra help. Everyone in the class spent many hours that night, but no one was able to come out with the right answers.

The professor had given the class the wrong answers by mistake.

* * *

Flush Ye Boneyard

* * *

AUTHOR

Professor J. O. Kraehenbuehl of the electrical engineering department has written a new second edition of his book, *Electrical Illumination.* The book released by John Wiley and Sons in January, deals with the principles underlying the specification and design of electrical lighting for commercial and industrial buildings.

Professor Kraehenbuehl, a member of the U. of I. faculty for 28 years, is also co-author with Professor Max Faucett of *Circuits and Machines in Electrical Engineering,* published in 1947.

* * *

Flush Ye Boneyard

* * *

HOURLY FRUSTRATION

Flash! The Chem department has just discovered a way to make sure that every student studies the last part of a course. An hour exam, to be held three days before the end of the semester, was announced in a quan course. On the morning of the hour exam, everyone showed up crammed full of knowledge. And then came the dawn. No hour exam at all. An hour exam had been announced merely to insure that some late semester studying would be done.

* * *

Flush Ye Boneyard!

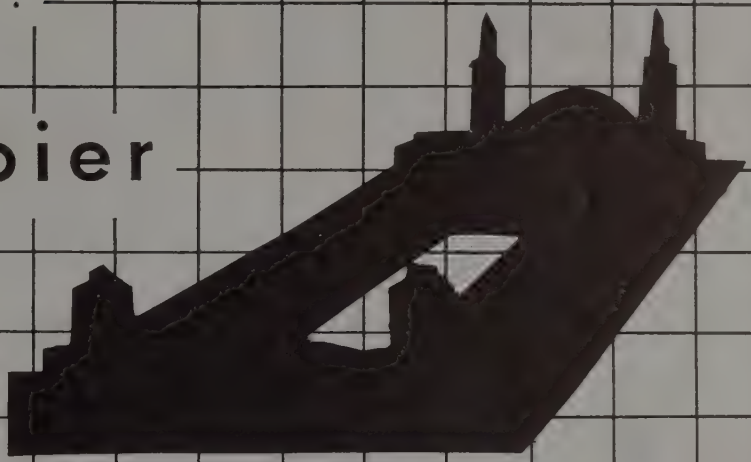
* * *

Stranger: "I represent a society for the suppression of profanity from your life."

C.E., to roommate: "Hey, Pat, here's a guy who wants to buy your Ford."

— the university of illinois at . . .

navy pier



Engineering Societies

AIEE-IRE

The Navy Pier chapter of the AIEE has just completed a very successful semester which was highlighted by many interesting speakers, field trips and an enjoyable Christmas Party. With the new semester getting under way, many plans have already been made to make this semester more outstanding. Several meetings with movies and guest speakers are planned, as well as discussions on the technical aspects of electrical engineering.

The society made two enjoyable field trips during the Christmas vacation. One trip, on December 26, went to the Ford Motor Company plant at 126th and Torrence Avenues south of Chicago. After visiting the receiving department where the parts arrive at the plant, the group was taken to the assembly line. Here the integration of all these parts into an automobile was observed. It was very surprising to learn that it takes but 7 hours and 45 minutes to complete the assembly of the finished product.

Two days later, the club sponsored a tour through the Delta Star Electric Company on Chicago's northwest side. They visited sales, factory, and assembly departments. It gave the members an excellent opportunity to see how high voltage equipment was made and tested.

ASME

Through the fine cooperation of its members, the ASME has completed a semester in which many outstanding field trips have been made. The latest of these took place on January 31, when a large group of Pier engineers went to the Allis-Chalmers plant in Milwaukee. The group chartered buses to take them to the plant and then were served lunch through the courtesy of the company.

(*Continued on page* 28)

NAVY PIER STAFF

Ray Lindahl ..... *Editor*
Richard Medley ..... *Associate Editor*
Gene Anderson ..... *Business Manager*
Warren Brandt ..... *Assistant*
Peter Cattapan ..... *Assistant*
Prof. Ogden Livermore .... *Faculty Adv.*

time for action . . . by Ray Lindahl, Arch.E. '54

We are just getting under way in a new semester, a new opportunity to gain the information so necessary to become a full-fledged engineer. By the time you are ready to graduate, you will have burned the midnight oil many times, attended many social activities and made many friends. Even though classwork is needed, an education is not complete without extra-curricular activities.

The importance of extra-curricular activities cannot be over-emphasized. Most educators firmly believe in the principle that they are necessary for a complete education for every student. The University and graduate engineers recognize the fact, and that is the reason why we have student chapters of the professional engineering societies on the campus.

It seems that many students are not aware of their importance, for a pitifully low percentage of them are members of our engineering societies. This disinterest of the students has caused two societies, within the past semester, to become inactive. The fault does not lie in the students who run these organizations for they are continually having membership drives and their meetings are always advertised.

The fault lies with the students who fail to realize that membership in an engineering society is an excellent opportunity to meet his fellow engineers. The companionship of others, interested in many of the same things, will not only improve a person's character, but will also give him an opportunity to learn more things about his chosen field and will make him better fitted by graduation to take a job in his field of interest.

With the school term just starting, it is an opportune moment for you to introduce yourself to your officers in the engineering societies' office in Room 150-B. The bulletin board outside the office is used to advertise their meetings. The valuable experiences gained by entering into the activities of a student chapter, sponsored by a national organization of professional engineers, will more than compensate for the time spent with them.

introducing . . .

by Jack Ullman, Eng.Phys. '51 and Tom Tucker, Ch.E. '53

ED TROSCINSKI

Edwin Troscinski was born on May 8, 1928, in Chicago. After the preliminary years in grammar school, he entered Gage Park high school in that city. While attending Gage Park, Ed was president of his sophomore class, a member of the school chorus, and a member of the baseball team for three years. He graduated fourth in his class of 260 in June of 1946. He was also a member of the school fraternity which recognizes high scholarship and athletic ability.

In September, 1946, Ed enrolled at the Navy Pier campus in the chemical engineering curriculum. The 5.00 he earned in his first semester gained him entrance to Phi Eta Sigma. While studying at the Pier, Ed participated in IM sports and joined the local chapter of the AIChE.

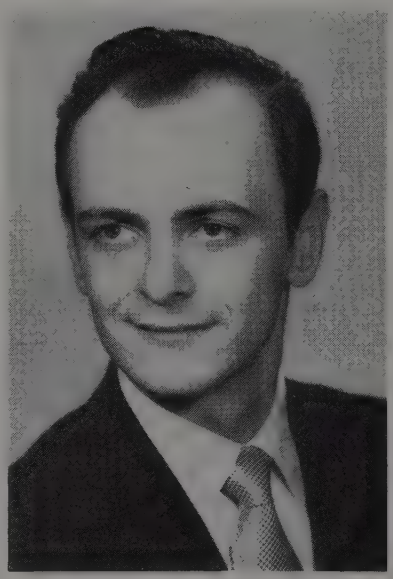
In the fall of '48, Ed moved to the Chambana campus to continue his studies. On this campus he remained active in the AIChE and was also a member of the University chorus. He designed the second-place AIChE float for the ISEE parade last spring. Ed was elected president of AIChE for the fall semester of 1950.

Ed likes to remember riding his float in the parade. He loved to shoot off fireworks, but spraying soot on a new convertible was even more fun. The best part was watching a woman frantically trying to remove her baby from the "acid" being sprayed from the float.

Another incident involving Ed and chemistry occurred when he tried to boil benzene directly over a Bunsen. The whole lab seemed to be in flames, but the campus firemen soon came to the rescue.

Ed graduated this February. He had a job with U.S. Rubber, but when his Uncle Sam offered him a job starting February 28, he found it impossible to avoid being drafted.

ED TROSCINSKI



JIM BIENIAS

JIM BIENIAS

Anyone who worked on ISEE, the engineering open house, last year, knows Jim Bienias, because Jim was everywhere while the exhibit was on. Anyone who knows Engineering Council remembers Jim well, because he represented ASME there last year and the earlier part of this year. But not many of these people know that his name isn't Jim. He is actually I. M. Bienias, but what the "I.M." stands for is classified information.

Jim Bienias (let us call him that; he prefers it that way) is a senior in mechanical engineering. In addition to his work on ASME and Engineering Council, he is also a member of the Junior Chamber of Commerce and Pi Tau Sigma.

Unlike many Illinois engineers, Jim has seen a lot more of life than most engineering students.

In February, 1945, he graduated from St. Rita's high school as a member of the National Honor society. He went into the Navy's V-5 program and between then and 1947, he was sent to Notre Dame, Illinois Institute of Technology, and Wilson Junior college. He then went to Pensacola under training as an aviation midshipman.

After his discharge, he worked as a metallurgical assistant in research for International Harvester. In February, 1949, he decided to return to college and came to Illinois.

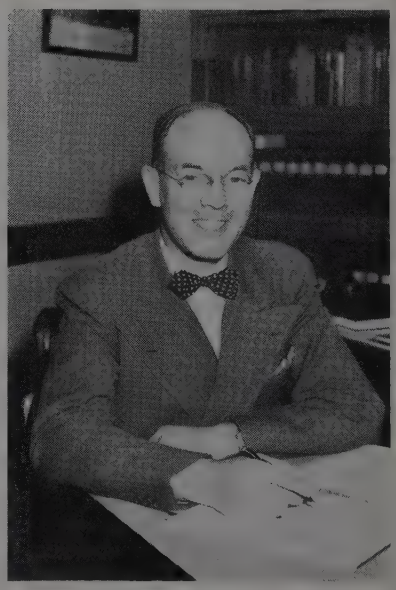
From his work and associations in ASME, Jim has derived some very definite ideas about furthering engineering interests here on the Illinois campus. One thing he would like to start is free student-faculty coffee hours in order to bring about a better relationship between the students and their instructors. He plans to work on this project during the coming semester.

He graduates in June of this year and expects to specialize in either gas turbines or home heating and ventilating.

PROFESSOR NORMAN A. PARKER

Professor Norman A. Parker, head of the mechanical engineering department, deserves one of the highest titles in the engineering profession, that of "The Engineer's Engineer." His background qualifies him for professional standing in mining, metallurgical, aero-

(*Continued on page* 18)



PROF. N. A. PARKER

honorary and society news

by Chuck Wade, M.E. '52 and Henry Spies, Ag.E. '52

ENGINEERING COUNCIL

Exemption of graduating seniors from final exams has been one of the Engineering Council's main projects this year. During the fall, the plan was submitted to other college councils—those of Commerce, L.A.S., and Agriculture—for approval by the faculty and students of these schools. Presentation of the plan to the University Senate will be arranged in the early spring.

Other interests of the Council this past semester were the all-University Career Conference, the organization of a society for engineering physics majors, and the biennial Engineering Convocation. At the Career Conference, to be held from February 26 to March 1, each society will present an engineering speaker from its representative field. Plans for the engineering physics society are being formulated by Bob Anderson and Bruce Gilbert. Herbert Hoover and Eddie Rickenbacker are two of the suggestions for the speaker at the Convocation to be held next spring.

St. Pat's Ball chairmen, Bob Cox and Bob Johnson, are mapping out work for their committees for the dance to be held in Huff Gym on March 10. At the present time, no band has been selected.

An extensive revision of the Engi-

(*Continued on page 22*)

A dance sponsored by the honoraries—Tau Beta Pi, Sigma Tau, Pi Tau Sigma, Chi Epsilon, and Eta Kappa Nu—was held last January 12 in Club Commons. Honorary members and their dates danced to the music of Wayne Karr and his orchestra, enjoyed the Club Commons floor show, and viewed the famous Blarney Stone, recently returned to the Engineering College. (ABOVE): Dance chairman Ed Wolff samples some ice cream proffered by Anna Lee Tishk. (UPPER RIGHT): Faculty members enjoy dance as much as undergraduate engineers. From left to right: Dr. J. D. Ryder, head of the EE department; Prof. P. K. Hudson; Prof. M. B. Reed; Mrs. Reed; Mrs. Hudson; and Mrs. Ryder. (LOWER RIGHT): Dancers pay no attention to TECH cameramen, except one startled LAS miss. (Photos by Carl Blanyer).

Only STEEL can do so many jobs

ACTION IN CALIFORNIA. On the north fork of the Feather River in California, Pacific Gas and Electric Company has placed two new dams . . . Cresta Dam and Rock Creek Dam. The huge drum gates for these dams, and the bridges directly above them, required 4,380,000 pounds of steel. They were fabricated and erected by United States Steel.

NEW SCHOOL HAS 2-WAY PROTECTION. No matter how absorbed these children become, they can't rush into the path of passing traffic, because they are protected by sturdy, long-wearing Cyclone Fence. And the fence not only keeps the children inside, it keeps undesirables out.

WASH DAY IS NO HEADACHE in hospitals, hotels, restaurants, clubs, or laundries where equipment is made of U·S·S Stainless Steel. For stainless steel means easy cleaning, corrosion resistance, good looks and long life. Lucky that United States Steel is big enough to turn out steel for washing machines as well as warships, for toasters as well as tanks.

AMERICAN BRIDGE COMPANY • AMERICAN STEEL & WIRE COMPANY and CYCLONE FENCE DIVISION • COLUMBIA STEEL COMPANY • CONSOLIDATED WESTERN STEEL CORPO
UNITED STATES STEEL COMPANY • UNITED STATES STEEL EXPORT COMPANY • UNITED STATES STEEL PRODUCTS CO

so well...

GH ON TANKS. The steel rocket fired this new 3.5 inch "superbazooka" already proved itself an effective i-tank weapon. It weighs nine nds, is able to penetrate up to 11 es of armor. Although mobilization require increasing amounts of steel, constantly-expanding steel-produc- facilities of U. S. Steel should enable o make plenty of steel for essential cetime uses, too.

NEW LIGHT ASSAULT TRANSPORT. Six rocket units help to lift the 40,000-pound weight of this new U. S. Air Force light assault transport in a recent test flight. With the addition of rocket units, the three-engine plane can now transport heavy loads in and out of small clearings. Only steel can do so many jobs so well.

FACTS YOU SHOULD KNOW ABOUT STEEL

American steel mills can out-produce the rest of the world combined by 13 million tons of steel a year. The plants of United States Steel alone are pouring more steel than all the Communist nations put together.

Listen to . . . The Theatre Guild on the Air, presented every Sunday evening by United States Steel. National Broadcasting Company, coast-to-coast network. Consult your newspaper for time and station.

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INTRODUCING . . .

(*Continued from page* 14)

nautical, and electrical engineering as well as his chosen profession of mechanical engineering.

His colorful life, which sounds more like fiction than reality, began in Salida, Col., a town of 5,000 population and 7,000 feet above sea level. Born on April 16, 1906, he grew up in a mining country where the discoveries of silver and gold lodes were making history at the turn of the century. Although his natural bent, both by environment and by heredity, should have been towards mining engineering, he determined to take up electrical engineering. He was a radio "ham" in high school and built his own neutradyne set in 1923, using wet batteries for power.

Throughout high school, Professor Parker had to be the breadwinner of his family and here he demonstrated an ingenuity that was to stand him in good stead later on in engineering. He began at first on a paper route in the seventh grade, but by the time he was a senior in high school, he had a sort of news delivery agency for the entire area and bought a little Ford car and employed other people to help him.

He entered his freshman year at the University of Colorado in 1924 to study electrical engineering. The following summer he worked as a mechanic and was then promoted to a machine inspector on construction work on the Moffatt Tunnel, a six-mile-long railroad tunnel in the Rockies. During this summer period, he was gassed with powder smoke twice, and broke two ribs and his jaw during the dangerous tunneling operations.

That fall, not having sufficient funds to return to college, he reopened an old mine that showed promise of rich returns in silver and lead. After this and several other business ventures, he returned to the University in 1926 and graduated in 1930 in mechanical engineering. By this time he owned a gas service station that had helped finance his way through college and also to support his family. The following year he became an instructor at his Alma Mater and tried several other ventures into mining by developing three gold mines and two gold placers, both in Colorado and New Mexico.

When he married in 1936, he took teaching as a full-time job. During the intervening summers, he worked with several firms. In the summer of 1938, he did design layouts on the now famous Lockheed P-38. This work and a later consulting job with Coomb's in which he directed the design of the Coomb's 40 plane sharpened his interest in aeronautical engineering. He became an assistant professor in the school year 1938-39, was made an associate professon and acting head of the department in that spring, and later on, in 1940, he was made a full professor.

During this time, he developed the department into a combined mechanical and aeronautical engineering department. For the war years, he was a consultant on plant conversion for the National Resources Planning Board and directed a research program on fuel volatility studies at a laboratory in the Rockies. Here, the freezing temperatures as low as –50° F. enabled experiments on the Allison engine of the P-38 at Arctic Circle conditions.

Professor Parker came to the University of Illinois in 1946 as head of the mechanical engineering department. Although the flat plains from Illinois are a far cry from his mountainous Colorado, he returns there each summer for fishing, mountain climbing and amateur prospecting with his 11-year-old son, Bob, and his 7-year-old daughter, Norma Jean, and Mrs. Parker.

Besides the work of his extensive life, Professor Parker has found time to become a member of many societies. He is a Knight Templar of the Masons and is a member of the Rotary Club, Acacia fraternity, ASME, IAS, Colorado Society of Professional Engineers, Tau Beta Pi, Sigma Tau, Pi Tau Sigma, Sigma Xi, and ASEE. He has served as chairman of many committees in these various societies.

A fugitive scientist from a horrow picture dreamed up a serum that would bring life to inanimate objects. He surreptitiously tried it on the statue of a great general in Central Park. The statue gave a quiver, and an instant later, came to life and climbed down from his pedestal. The scientist was overjoyed. "I gave you life!" he exulted. "Now tell me, General, what is the first thing you are going to do with it?"

"That's easy!" rasped the general, ripping a gun from his holster, "I'm going to shoot two million damn pigeons!"

* * *

Mama Mosquito: "If you children are good, I'll take you to the nudist camp tomorrow night."

* * *

"I love you—ouch!"

"I love you—ouch!"

And there you have the story of two porcupines necking.

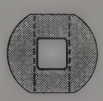
* * *

Journ major: "You girls wouldn't care to go with us, would you?"

Lawyer: "Would you girls care to go with us?"

Engineer: "Where do we go, you lucky girls!"

A touch of gold... a lot of Engineering!



GRID FRAME
(actual size)

This is the grid frame for an electron tube that plays a vital part in the Bell System's radio relay network for long distance telephone calls and television programs.

Across the central hole of a frame—between dotted lines—tungsten wires .0003 of an inch in diameter, so fine you can barely see them, must be placed with their centers .001 of an inch apart. How to fasten this wire securely to a frame posed a problem that took the combined skills of many kinds of engineers.

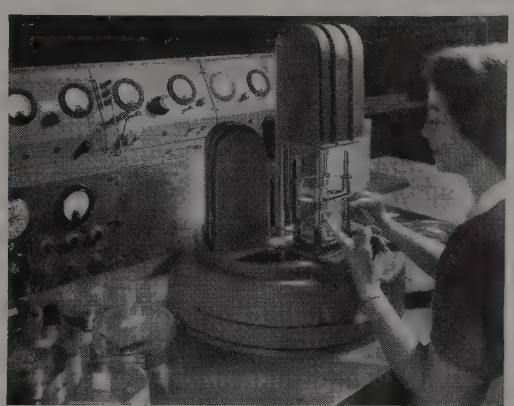
Electrical, Chemical and Metallurgical Engineers decided it could best be anchored with gold. Why gold? Because it is inert in a vacuum, reduces grid emission, is suitable for the working temperature of the tube and is a good electrical conductor.

Physicists, Electrical and Mechanical Engineers tackled this problem — and adapted the machine shown, in which frames are placed—forty at a time—on a two-level rack. Between the uprights of the rack are heating coils into which short lengths of 24 karat gold wire are placed. An air-tight cover is lowered, the chamber evacuated and heaters are switched on. When vacuum and temperature are just right, the operator passes a carefully controlled current through the coils and the gold vaporizes, covering the grid frames with a coating .00002 of an inch thick. Only about two and one-half cents worth of gold per frame is used.

Tungsten wire is next wound around two frames at a time. These are put into a hydrogen atmosphere and heated until the gold melts and brazes the wire firmly to both frames, which are then split apart.

Industrial Engineers made thorough job cost and time studies which show this new process is fast and economical.

Working closely together, Western Electric engineers of varied skills are constantly developing new, better and more economical ways to make telephone equipment. That's how they help the Bell System give this country the best telephone service on earth at the lowest possible cost.



This unusual machine turns gold into vapor to gold-plate little grid frames at Western Electric.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

EXPLOSIVES . . .

(*Continued from page* 9)

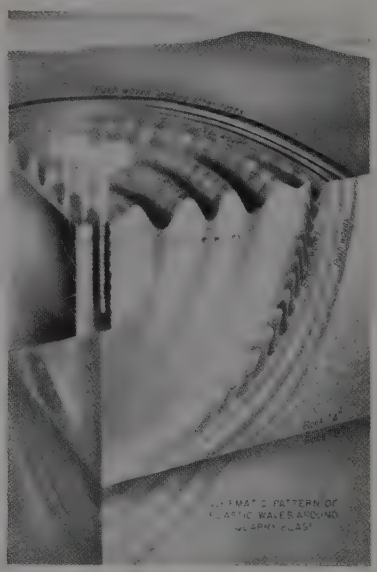
this time, 1864, on, the era of explosives came into its own. Within a few years explosives were being manufactured in quantity.

Nitroglycerine wasn't the best explosive, however, to be discovered. For one thing it was very dangerous to transport from one place to another. So, in 1875, Nobel found that by mixing 90 parts of nitroglycerine to 10 parts of gun cotton, a tough jelly like mass was formed. This is blasting gelatin, the most powerful commercial explosive in use today. It is relatively safe to handle and is highly water-resistant. Blasting gelatin's velocity of detonation can be made as high as 26,000 *ft/sec* and it produces a very shattering effect.

Perhaps the best known explosive is straight dynamite made by adding nitroglycerine to a combustible such as wood meal, sodium nitrate, and an anta-acid. The per cent of nitro-glycerine varies from 15 to 60 per cent. However, a 40 per cent dynamite is not twice as powerful as a 20 per cent one. This is due to the other materials or explosives which are added. One bad feature of straight dynamite is the large amount of toxic gases produced when it explodes.

Another bad feature is the fact that a straight dynamite will freeze at about 0°*C*. This brought about the discovery of low freezing dynamite which contains nitro-starches. Their velocity of detonation is from 8,800 to 19,000 *ft/sec*.

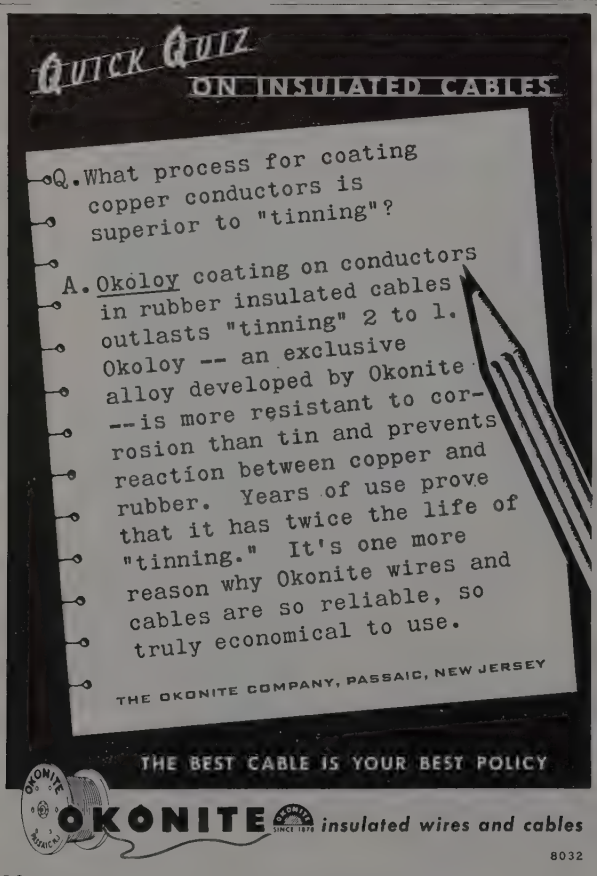
There are many other explosives which contain nitroglycerine in varying amounts and in combination with different substances. However, there are some explosives which have other bases. One such base is TNT, trinitrotoulene, which is formed by the action of nitric acid on toulene, a coal tar derivative. Amatol contains TNT and 80 per cent ammonium nitrate. Amatol is used in coal mines because it produces a flame of low temperature and relatively few toxic gases. Ammonium nitrate is used as a substitute for nitro-glycerine in forming many ammonia dynamites. Still another explosive is based on the exothermic reaction of powerful metals and oxygen.



A cutaway shows the schematic pattern of elastic waves around a quarry blast. (Courtesy of Explosives Engineer).

Although not true explosives in the sense that nitroglycerine and TNT are, a word could be said about the use of compressed air and liquid gases. These are coming into wide use because of the safety in storing and handling. Liquid carbon dioxide, under the trade name cardox, is just one of the gases used. About four *lbs* are placed in a three *ft* shell, four *in* in diameter. An electric heating device causes the liquid to "boil" and blow out one end of the shell. Pressures up to 20,000 *psi* are developed.

The field of explosives is an exhaustive one. Many books have been written on the subject, and the reader must realize that this article merely gives a small view of one phase of that field.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BANQUET . . .

(*Continued from page* 10)

Ryder himself, the Head of the department of electrical engineering. "Dr. Ryder" was engrossed in a recent issue of *Shaft,* but tore himself away long enough to welcome the two "ex-students" back.

Among other places visited was the Dynamo Lab; they were just in time to see a squad turn on a large motor, under the direction of "Prof. Williams." The motor disappeared in a cloud of smoke, and the bogus Williams rushed to the rescue with an electric fan.

Among the other instructors and professors honored by the attention of the students were Prof. W. G. Albright, who was seen carrying a large and impressive bedspring "antenna," complete with roosting pheasant; he had just successfully completed a long effort to pick up station WKID from the E.E. building, not knowing that station had been off the air. M. H. Crothers, R. S. Elliott, C. L. Coates, and R. E. Wendt were portrayed conducting their classes in their usual manner. The class of "Prof. H. W. Horn" was precipitately dismissed when he brought the wrong box of educational slides; the first slide flashed on the screen was a group which would be of more interest to art students than to illuminating engineers. (At least theoretically!)

The last student skit, "Power Switch," was indeed a switch—a large group of prominent power-option instructors were shown in a class being taught by a student instructor. Various professors were called upon to answer questions, which they did in their best classroom manner. "Prof. Knight," a well-known railroad man, interrupted the procedings several times with his concern over the lateness of mythical "Number Four," and "Prof. Reid" came in late with the excuse that "some (adjective) student stole my parking place."

Upon the completion of the student skits, more awards were presented. The newly organized Sigma Phi Nothing faculty honorary society, headed by President Ron Mackin, alias Frank N. Stein, gave recognition to a group of faculty members for their character and attributes. Among the awards were an "Our Hero" badge to Prof. P. F. Schwartzlose for his bravery in being one of the few faculty members who gave their correct names when purchasing tickets; and a pair of gaudy suspenders to Prof. M. H. Crothers for his display of faith in appearing before his classes day after day without belt or suspenders. Others honored were Prof. C. A. Keener, R. E. Wendt, C. L. Coates, and Dr. J. D. Ryder. Two other faculty members selected, Professors J. O. Kraehenbuehl and R. M. Wainwright, were not present, so it was announced that their awards would be presented "post-humorously."

The staff took their turn with a skit entitled "W. T. at Illinois," which purported to show the evolution of one Willie Turnipseed, electrical engineering student at the University of Illinois. Mr. Turnipseed appeared before a board of experts as he applied for admission to the College; in an intensive oral quiz he demonstrated vast knowledge and ability, and gave evidence of high moral character. Years passed; at his pre-graduation exercises, W. T. again appeared before the experts to display the results of his four years' work. The trim and erudite W. T. was now transformed into a slovenly individual without a brain in his head, who "didn't come here to be abused." Willie floundered through such problems as the total number of apples from two trees bearing four apples each; but he shone on conundrums such as the exact distance between LARH and the rock garden, given in terms of blanket lengths and portable radios. Finally the committee decided they could do nothing with him, and, not wanting him around any more, allowed him to graduate. In a last gesture the Board presented him with the "Keyhole to Success," and bade him go out and find the key.

Such was the Senior-Faculty Banquet for 1951. One hundred and eighty-seven students and professors went on their ways rejoicing.

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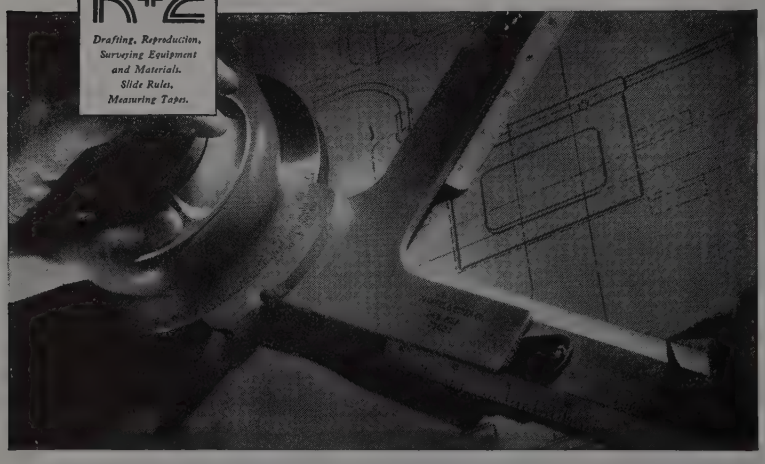

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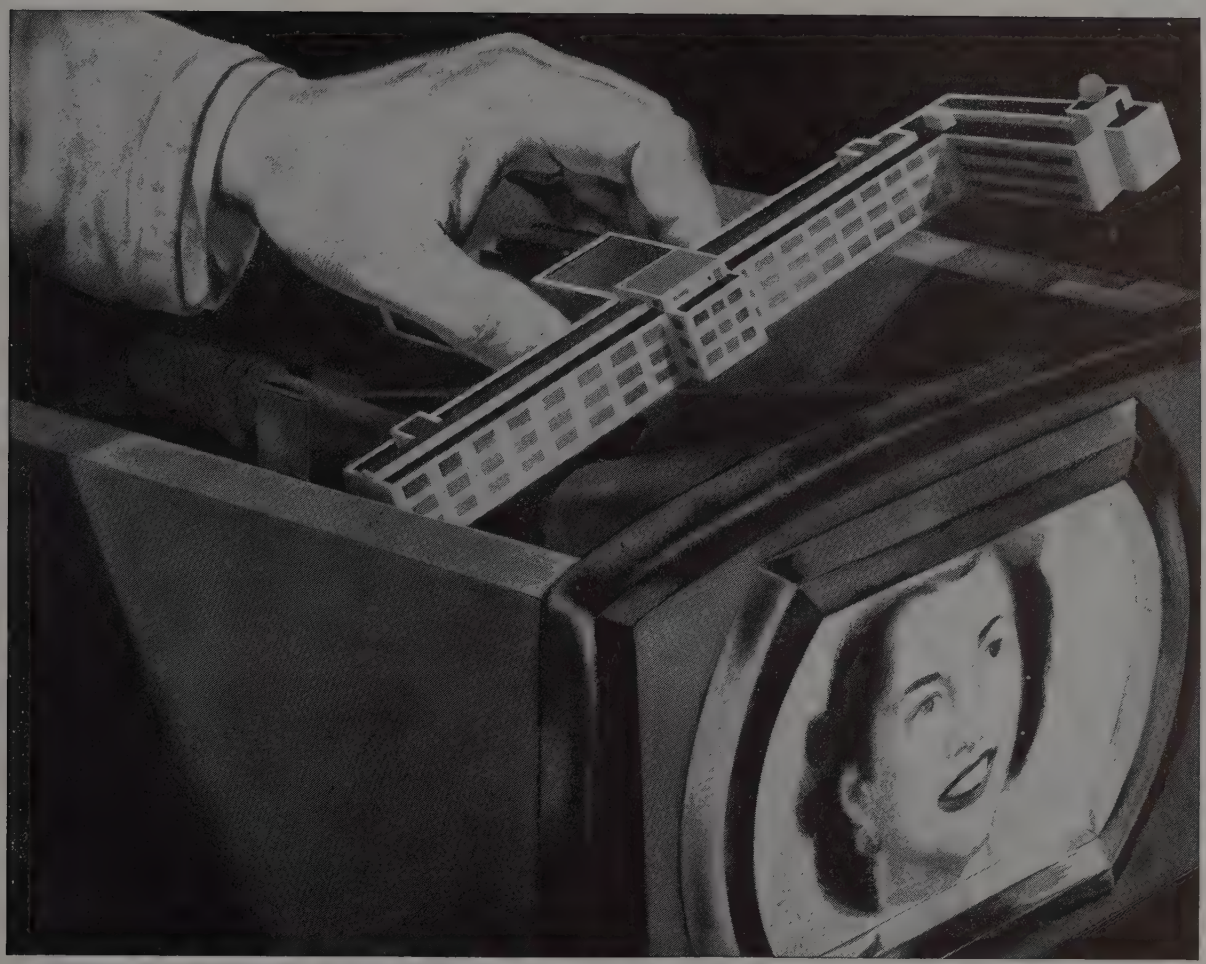
SOCIETIES . . .

(*Continued from page* 15)

neering Council Constitution was approved and passed at the January 4 meeting. Principal changes included an enlargement on the scope of Council aims and activities and the extension of an open invitation to all honorary societies to attend meetings. Earlier in the semester a proposal had been made to invite all engineering honoraries to become members of the Council. Through the discussions of following meetings, the Council finally decided upon keeping the meetings open to the honoraries but not including them as actual members, since honorary society members were felt to have sufficient representation through their professional societies. A unanimous vote of thanks was given to Constitution committeemen Ray Brown, Corliss Laisure, and Ernest Elm for their hard work.

Elections held at the last meeting of the semester, January 18, gave the following results: Adolph Brux, president;

(*Continued on page* 24)



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SOCIETIES . . .

(*Continued from page* 22)

Ed Christiansen, vice-president; Wayne Hartman, recording secretary; Bruce Gilbert, corresponding secretary; and Corliss Laisure, treasurer.

AIChE

The semi-annual smoker on February 21 at the Illini Union will be the first meeting of the new semester for the American Institute of Chemical Engineers. Plans are being made for a trip to the student convention at Northwestern University, Evanston, on March 3. The convention is being sponsored by the Northwestern University chapter of the AIChE.

Six other meetings are planned at approximately three week intervals throughout the semester. Movies pertaining to the chemical industry or related fields will be shown at two of the meetings. Arrangements have been made to have an agent of the FBI speak on "Clearance and Investigative Procedures" at the meeting to be held on April 4. The annual spring picnic and the annual banquet will be held sometime during the last two weeks in May.

Officers of the AIChE for the coming semester are: Donald Coop, president; John Georges, vice-president; Ralph Swingholm, secretary; George Michalski, treasurer; and George Ratkovic and Jerry Slusser, Engineering Council representatives.

ASAE

The following officers for next semester were elected at the January 9 meeting: Dave Cash, president; Elvin Carlson, vice-president; Dave Harris, secretary; John Huber, Engineering Council representative; Henry Spies, scribe; Merle Noble, chairman of Program committee with Arnold Moodie and Leonard Hardy serving; and Harold Ralston, chairman of Arrangements committee with John Lowery and Bill Rohaly serving with him.

Prof. Lehmann presented Dick Black with a $250 scholarship on the basis of his "scholarship, practibility, and sociability."

The main speaker of the evening was Mr. Donagher of the export division of the Oliver corporation. He described his work and explained how new engineers were started out in his company. He later interviewed students interested in full-time or summer employment.

SIGMA PHI DELTA

Sigma Phi Delta, social engineering fraternity, has taken five new pledges and will initiate eight or nine new men at the beginning of the spring semester. Plans for the annual Spring Formal are being arranged.

Arnie Sauers will head the house as president for the new term, with Douglas Miller serving as vice-president. Donald Bailey as secretary, Elmer Schirmer, the new business manager, and Adolph Brux, pledge-master, round out the officers' roster.

ASCE

The student chapter of the American Society of Civil Engineers held its fourth meeting on January 16 in the Illini Union. During the meeting, an informal smoker, President Ronald Hoefle announced the names of the candidates for office for the coming semester who would be selected by mail ballot. Revisions of the chapter constitution were discussed by those attending the meeting. Ronald Hoefle and James Stein and the officers for the coming year will rewrite

(*Continued on page* 26)

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SOCIETIES . . .

(*Continued from page* 24)

the present constitution with special emphasis to be placed on the methods of nomination and the balloting of officers. Plans were also made at this meeting for the membership drive during second semester registration.

Results of the ballot election show that Frank Blake will take over the presidency; Peter Kuhns will assist as vice-president; John Lower and John Moore will serve as corresponding secretary and treasurer, respectively; and Vito Spadevecchio and Emory Kemp will represent ASCE on Engineering Council.

CHI EPSILON

A formal initiation and banquet honored new pledges of the Alpha chapter of Chi Epsilon, civil engineering honorary, last January 9.

A dinner of grape juice frappee, baked ham, escalloped potatoes, buttered peas and mushrooms, pineapple cranberry salad and coconut layer cake greeted hungry eyes at the banquet. W. S. Pollard acted as toastmaster, and the welcome and response were given by James Foss and Roy Peterson, respectively. The main address of the evening was given by Lt. Col. J. C. O'Hara. Don Reilly, Harry Rimby, and Ralph Dix were members of the banquet committee.

New initiates at this meeting included: Erick Bergstrom, Frank E. Blake, Jr., James B. Bouldin, James D. Brown, Alan L. Chase, Walter E. Deuchler, Walter D. Fisher, Harry F. Hillman, Harold Hulett, John W. Hutchinson, Henry J. Karpinski, Bobby M. Kell, Orlando A. Krueger, Thomas F. Leahey, William K. Marlatt, Jefferson F. Newton, Robert C. Peterson, Daniel Rinck, James F. Tavares, and Alfredo D. Vergara.

At a brief meeting held on the following day, January 10, the following officers were elected for the coming semester: Ronald A. Hoefle, president; Walter D. Fisher, vice-president; Harry D. Rimbey, secretary; Erick B. Bergstrom, Harry F. Hillman, associate editor of the Chi Epsilon newspaper, *The Transit.*

IES

Mr. Leonard V. James, illuminating engineering consultant of LaGrange, Ill., and formerly connected with the General Electric Co., was the guest speaker at the January 10 meeting of the Illuminating Engineering Society. His talk covered two topics very well and was called "The Versatile Illuminating Engineer and Landscape Lighting."

During the spring semester, Don Phillips will succeed Val McClusky as president of the society. Other officers are: Bill Richards, vice-president; Ben Stahlheber, corresponding secretary; John Underwood, recording secretary; and Al Leavitt and Vito Polton, Engineering Council representatives. Al Hart has been serving as chairman of the program committee.

IAS

"If you have any questions about the draft and/or the United States Air Force . . ." was the question that the Institute of Aeronautical Sciences put to its members at the January 10 meeting of the society.

Lieutenant Colonel Franklin W. Dooley, commandant of the AF-ROTC here at the University, answered such questions in his talk on "The Aeronautical Engineer and the United States Air Force." Following the talk, a business meeting was held, and an election of officers.

(*Continued on page* 28)

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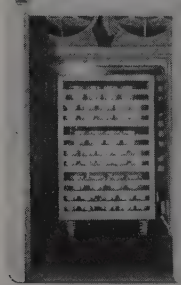

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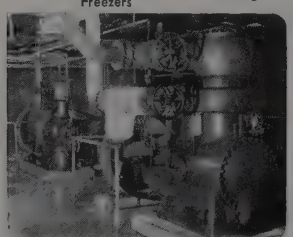

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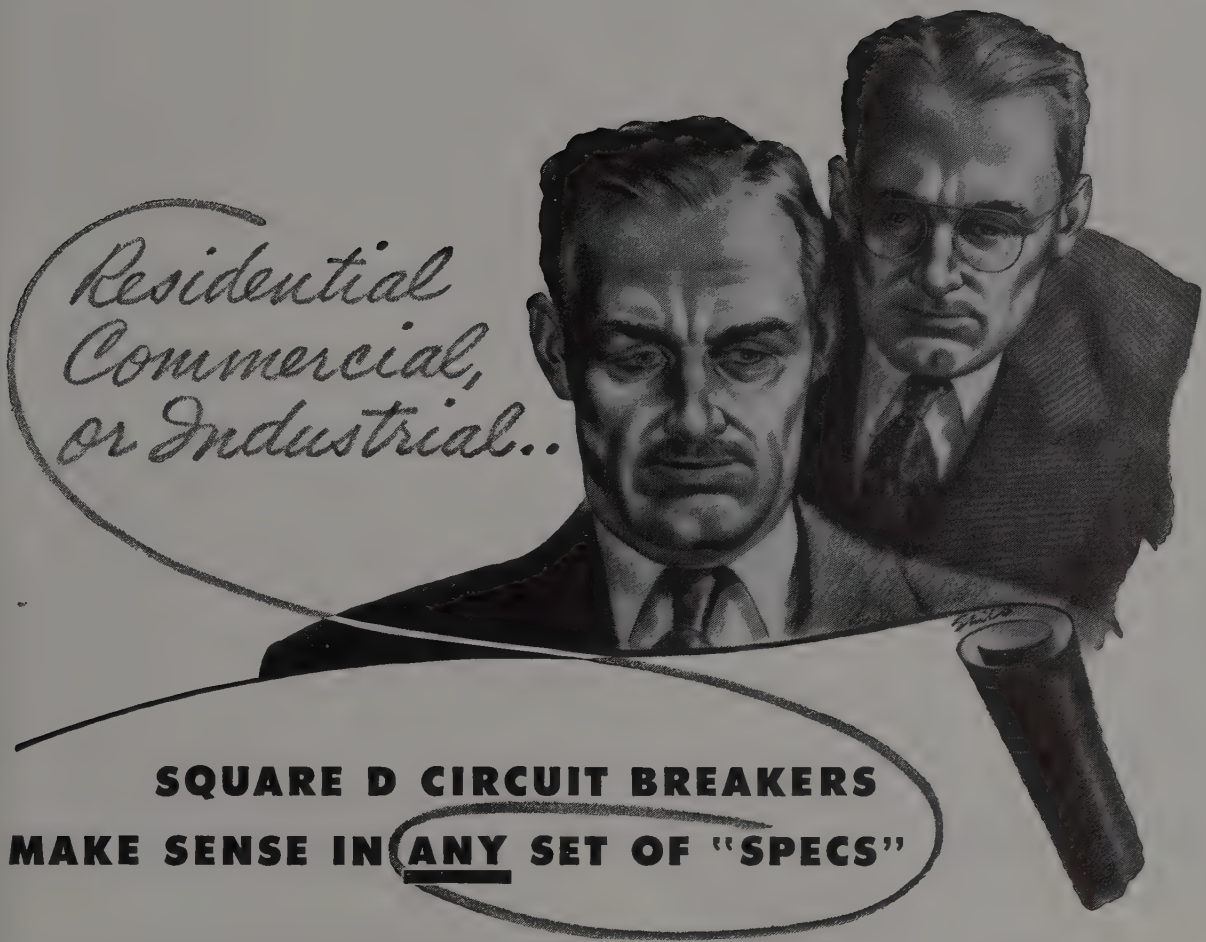

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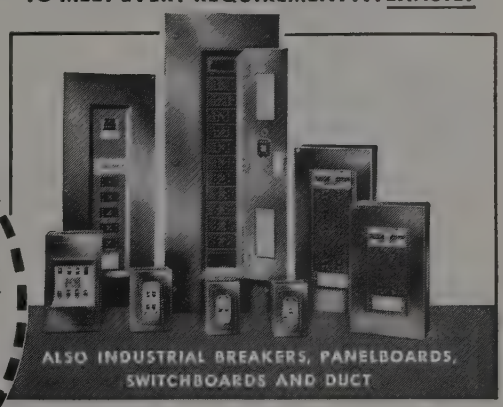

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SOCIETIES . . .

(*Continued from page* 26)

AIEE-IRE

The first event of the spring semester will be an on-campus field trip to the betatron research lab, Abbott power plant, and the E. E. research lab. Transportation to the betatron building and the power plant will be furnished by bus. Guides will take the group through the buildings and explain equipment and procedures. A tentative date has been set for February 21.

C. N. Hoyler of RCA has been contacted for a meeting later in the semester. Mr. Hoyler gave an excellent talk and demonstration on black light, fluorescent materials, computers, and other apparatus some years back on this campus.

A technical papers competition will be held again this semester. This contest is open to all E.E. students; papers on technical subjects, not necessarily connected with electrical engineering, are prepared by the contestants, and a talk covering the essentials of the material is given during the contest. A panel of judges selects a first and second prize winner; both receive cash prizes. The winner receives in addition, a trip with travel expenses paid to the AIEE district convention, to be held this year in Madison, Wis. He will enter the district contest, and has the opportunity of winning additional prizes.

NAVY PIER . . .

(*Continued from page* 13)

In the afternoon, the group took a tour through the immense plant. It would actually require several days for the group to see the many operations that were in progress. It was an extraordinary opportunity to view mass production and it was a group of tired, but well satisfied engineers who made their weary way home that evening.

AIA

Throughout the month of January the architecture department has had the pleasure of viewing an exhibition of the work of Schweikher and Elting, the well-known architects. Mr. Winston Elting from that firm addressed a very large group of the AIA student chapter at their January 9th meeting. The Archies appreciated the opportunity to hear a famous architect present his ideas.

The department has also been exhibiting 275 prize winning designs in the Better Homes contest sponsored by the Tribune.

An inspection trip is being planned for the month of February to Frank Lloyd Wright's Johnson Wax Tower laboratories. This trip will offer an excellent opportunity to see the general office area of the famous building that has an advertising value equal to that of the Fibber and Molly McGee radio program.

introducing . . .

JOHN D. Mc NEE

During the past semester, many of the architects at the Pier, have had the pleasure of having Mr. John McNee as their art instructor. With his remarkable and diversified training in art, he has been an inspiration for the students to produce improvements in their work.

When Mr. McNee had completed his Master's degree at the University of California, he went to France where he continued his education at the Beaux Arts School. Upon completion of his work there, he returned to this country and attended the Claremont Graduate School in California. Besides his work as an instructor, Mr. McNee has presented several pictures for exhibition

(*Continued on page* 30)

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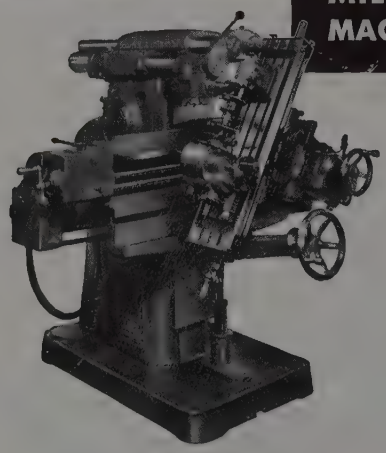

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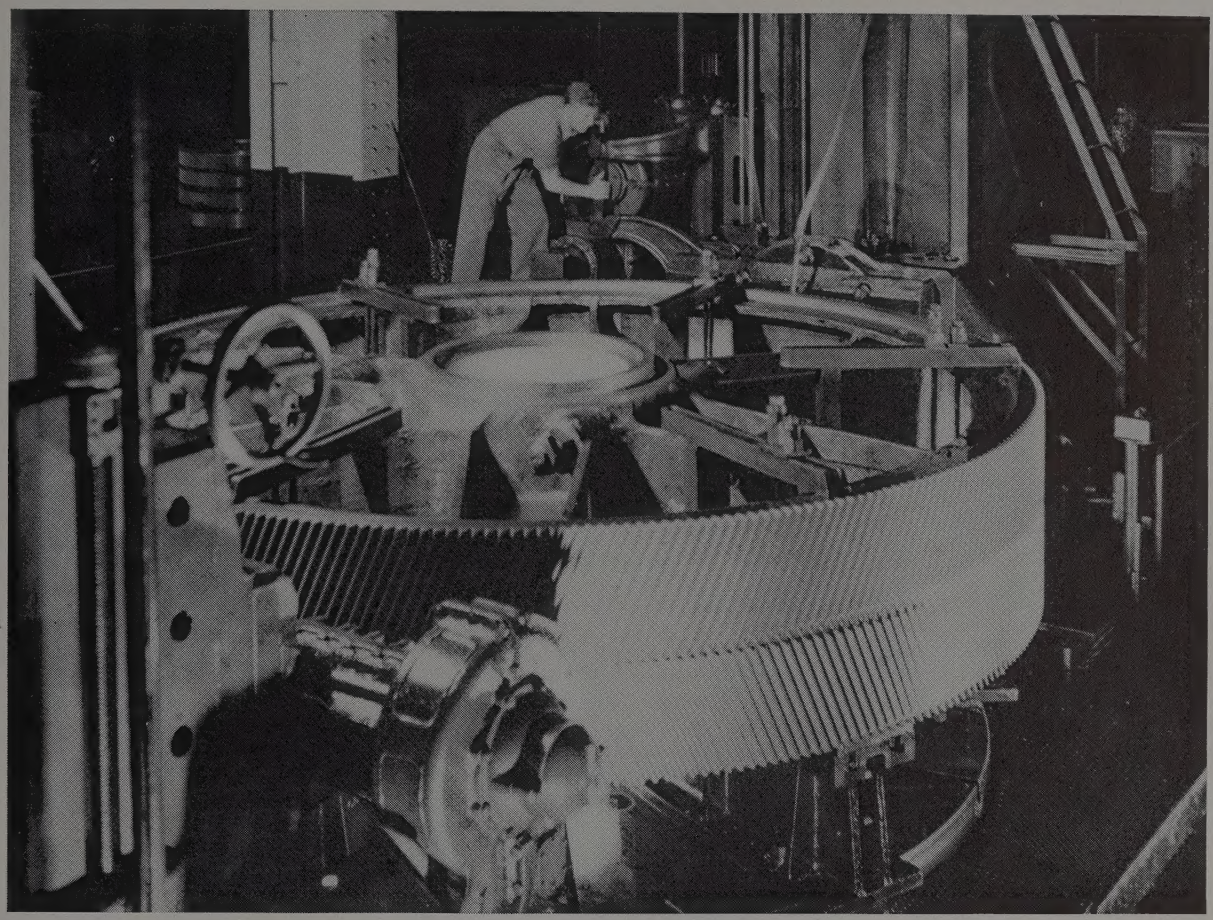

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OIL helps in the practical realization of these words from our nation's Constitution. America's machine power, once again straining to meet both civilian and military demand, depends on the skill of trained technical men to avoid costly shutdowns, to keep continuously on the job.

Throughout the history of machines, corrosion has been one of their deadliest enemies. Standard Oil has always endeavored to improve its industrial oils, to make them not just better lubricants but more effective rust inhibitors as well.

Our industrial oils contain newly developed additives that prevent much of the trouble caused by corrosion in bearings and moving parts. These oils have the ability to form protective surfaces on areas subject to corrosive forces. They cut down lost time that robs machinery of its ability to produce.

Yes, there's more to "oil" than just oil. Standard Oil research, which looks to America's engineering colleges for new blood, is constantly facing and solving problems so as to increase efficiency and pack more hours and days into each year of machine operation—at a time when even minutes count.

Standard Oil Company

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STANDARD

NAVY PIER . . .

(*Continued from page* 28)

throughout the United States. At the present time, several of his paintings are on exhibition at the Elizabeth Nelson Gallery.

It is the contention of Mr. McNee that the primary purpose of an art course, like the one offered at Illinois, is to strengthen the students' feeling for design. He believes as Irwin Edman, author of "Arts and the Man," that "the architect must learn not to build mistakes, but to give artistic appreciation to a building, by the use of visual materials, and to strive for both expression and function." A fifty gallon barrel can be a place to live, but it is not psychologically comfortable. It takes spacial and linear relationships as well as the use of colors to maintain a favorable emotional state in a person.

Mr. McNee feels that there is a large correlation of feeling between art and architecture, more so than between any of the other arts. He also thinks, if it were at all possible, that the addition of work in the fields of sculpture and interior design would be a helpful addition to our courses. These would be a means of developing a feeling for design that would express a building as a symbol of a living art.

words of wisdom from Harvard of the Rocks

It is with a note or regret that we start out our column this month because Shirley has left us. We miss her smiling face from behind that desk in the G.E.D. office. There is but one note of cheerfulness, for our loss has been the gain of you Champaign engineers, Shirley and her husband, an architecture student, are now down with you and so when you see them, tell the Webers that the Pier engineers miss them.

Hey, who's going to sell the no-doze tablets this semester? It is such a big business we thought that someone would have gotten the franchise by now. We have noticed a distinct need for them in these chemistry, physics and history of architecture lectures. While we are on this subject we have heard about the next special event for the Archies, "a no doz roast for doz who like roasted no dozes."

Hurry! Hurry!

We have heard reports from those that ought to know, that the entire male student body should sign up for classes in geology. It is their contention that it will be very useful when the time comes for digging a home in a hurry. It seems that in geology they teach you to identify hard and soft soils.

We would like to present this intelligent definition of a woman. She is a person who can hurry through a drugstore aisle 18 inches wide without brushing against the tinware piled up there, and then drive home and knock off one of the doors from a 12-foot garage.

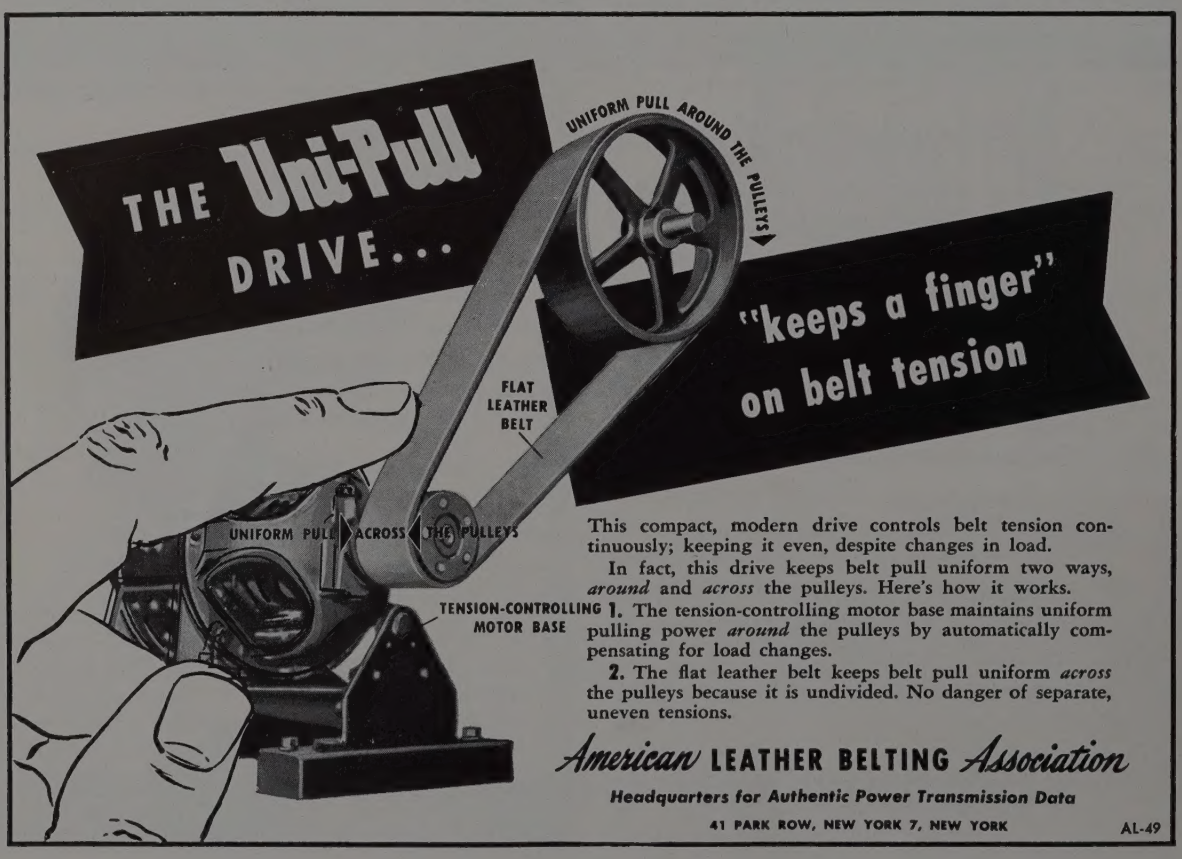
Due to the present world situation we are recruiting any and all female engineers for our staff. If there are any interested in writing or if there are any other geniuses who feel they have anything to contribute, that is printable, give it to the editor in our office in 150-B. We are sincerely afraid that in the fall the Illinois Technograph will become the fashion magazine of the University with contributions by the female students who will then be running the student body.

Professor: "Young man, why aren't you taking notes?"

M.E.: "I don't need to, sir. I got my grandfather's."

* * *

You haven't had a real hangover until you can't stand the noise made by a Bromo-Seltzer.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THE DU PONT DIGEST

Bringing Up Alathon*

Du Pont scientists find great promise in this young member of the wax family

One of the most interesting and versatile of the new plastics is Du Pont "Alathon" polythene resin, chemical cousin of paraffin.

Because of its unusual combination of properties, it is now being used in everything from "squeeze-bottles" for toiletries to cable insulation and chemical-resistant linings.

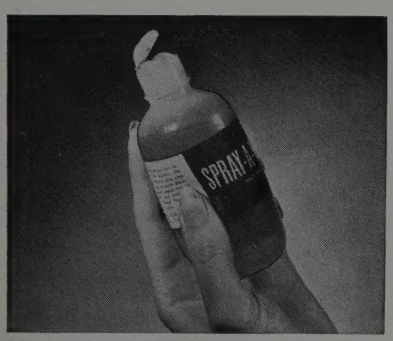
"Alathon" was born when English scientists used high-pressure synthesis to create polythene, the solid and semi-solid polymers of ethylene.

Du Pont scientists and others added their background in high pressure work to the field of ethylene polymers. This concerted effort produced a greatly expanded range of uses.

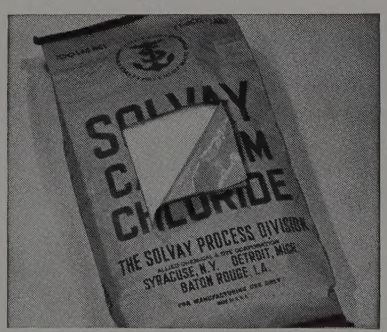
Taking First Steps

The first step of Du Pont chemists and engineers was to produce polythene in the laboratory to confirm earlier findings. Then the product was turned over to chemical engineers for pilot-plant work. Finally, a plant for full-scale commercial production was designed by chemical, mechanical and electrical engineers and metallurgists.

Many of the most promising uses for "Alathon" could not be realized until technical difficulties were overcome. For example, the chemical inertness, which is one of the outstanding properties of the material in film form, also made the casting of film from solution impractical because it could not be dissolved in suitable solvents. In devising a special extrusion technique to solve this problem, Du Pont engineers opened up a whole new field of possibilities.



Blow-molded "Alathon" *bottle, with molded closure. It emits a fine spray when squeezed.*



Multiwall bags *for chemicals and foods are made of kraft paper coated with "Alathon."*

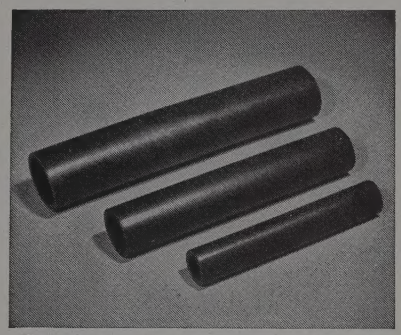
Acid-Defying Paper

In film form, "Alathon" lends its strength, chemical inertness and resistance to grease and moisture to packages for chemicals, foods, metal parts and moisture-sensitive powders. In still another form in which these properties are employed, paper coated with "Alathon" is used as wrapping for bakery products and moistureproof containers for chemicals that would attack uncoated paper. (Experimentally, "Alathon" coated paper has been exposed to concentrated sulfuric acid for days without harm; the same paper, uncoated, was ruined within a few minutes.)

The protection of "Alathon" was extended to metal tanks and drums when Du Pont engineers developed a spray-flaming coating technique.

In the field of electricity, too, "Alathon" is proving of great value. Its outstanding electrical properties make it an ideal insulator for wire and cable, particularly in the high-frequency applications necessary in television and radar.

All "Alathon"—*ice-cube trays, refrigerator bowls, tableware and protective coverings.*



Pipe *made of "Alathon" is used for handling corrosive chemicals, solutions and gases.*

"Alathon" in powder form is used for molding a wide range of light, tough and flexible plastic articles. In addition to bottles, these include tumblers, dishes, jar caps and ice-cube trays. Extruded as a film, it serves for garment covers, tablecloths and rainwear.

The future looks bright for "Alathon." New applications such as extruded pipe for mines and separators for storage batteries seem about to be realized. Other uses yet undreamed of will no doubt emerge from the close, continuous teamwork of technical men that typifies Du Pont research. *REG. U. S. PAT. OFF.

DID YOU KNOW . . .

six out of ten Du Pont plant managers and superintendents started with the company as chemists, analysts, technicians or engineers.

DU PONT
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skimming industrial headlines

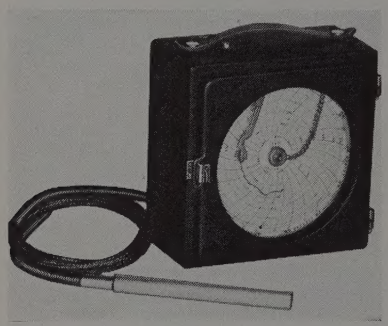
edited by Bob Hardin, E.E. '54

refrigeration recorder

A continuous record of actual temperatures in refrigerated trucks, railway cars, warehouses, ships, and retail stores' units, is provided by the new Minicorder, a self-contained recording thermometer.

With this new instrument, an accurate check of storage space temperatures is available to those engaged in the shipment, storage, or merchandising of commodities requiring refrigeration.

The instrument requires no connection to any power supply, yet records



This new refrigeration recorder provides a continuous record of actual temperatures.

temperatures over a period as long as seven days without attention. A specially developed shock-proof mechanism makes it particularly satisfactory for use in trucks, trailers, railway refrigerated cars, and ships, where it can be installed with the cargo, without shockproof mounting, and depended upon to record an accurate graph of ambient temperatures over a seven-day period.

digital computer

An electronic computer which will be 5,000 times faster than a human being in supplying the answers to complex mathematical problems has been developed by GE. Although officially unnamed, it is presently referred to as "Omibac," an engineering abbreviation for "Ordinal Memory Inspecting Binary Automatic Calculator."

The machine utilizes only two digits —1 and 0—and a code is made up from these two digits for every other number. Because these two digits can be made to answer to an electrical "on" or "off," the system lends itself readily to high-speed computations.

"Omibac" can be used for very complex problems which will require hours or days to solve. Such problems would take months or even years for a human to solve.

world's fastest boat

Slo-Mo-Shun IV, owned by Stanley Sayres and designed by Ted Jones, is the world's fastest boat, and holder of several speed records. She averaged 160.3235 *mph* in two straight-away mile runs on Lake Washington to set a new world's speed record. With Jones driving, she set a new race record (78.216 *mph*) and a new heat record (80.897 *mph*) to sweep the 1950 Gold Cup Race in three straight heats. At the annual Harmsworth Trophy Match, she set two more records. Slo-Mo-Shun IV averaged 100.680 *mph* over the 40 mile course—the first speedboat to average over 100 *mph* in competition racing.

Jones and Sayres spent months analyzing causes of failure in every major racing craft before drawing a single plan for Slo-Mo-Shun IV. In studying conventional three-point hydroplanes, they came to the conclusion that these craft wasted much of their power potential by traveling in tremendous forward leaps that carried them clear out of the water.

Jones suggested adding a fourth plane to the hull—a feature that he had worked on for years. Because of the added plane, and its remarkable balance, Slo-Mo-Shun IV skims along the water, supported by a film of air that puts her in perfect suspension; only the forward sponsons, the rudder, and propeller are in the water.

Shafting was the next problem — a problem common to all power boats including hydroplanes, but one extremely critical with Slo-Mo-Shun IV because of her radical design. Instead of using a transfer box forward of the engine, as most racing craft do, Slo-Mo-Shun IV's engine and gear box are installed as an integral unit, with the three to one gear box installed after the engine.

Both the engine and gear box are tilted to the shaft angle, eliminating the need for a universal joint. Without this joint to take up some of the strain, all the driving power of the 1800 *hp* Allison engine is applied direct to the shaft, twisting it around at speeds up to 10,800 *rpm*.

The trim little Slo-Mo-Shun IV, world's speediest speedboat, comes to rest along her mooring dock. (Courtesy of Mechanical Topics).